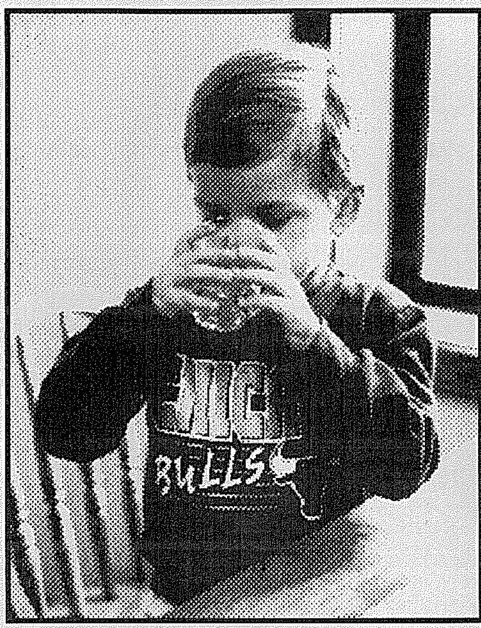
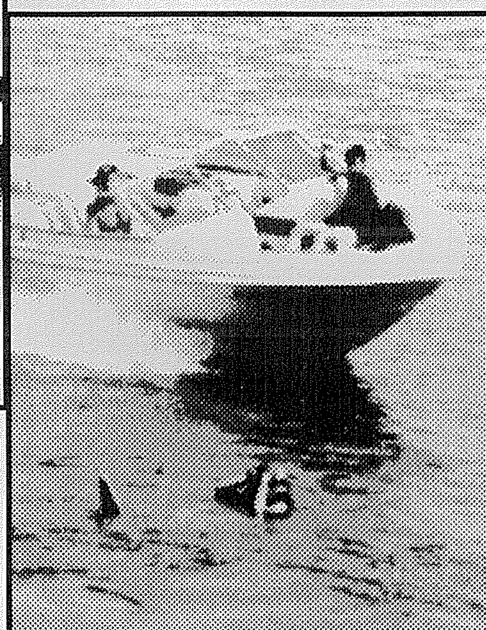
# Idaho Statewide Work Plan for the 1995 Beneficial Use Attainability and Status Reconnaisance Survey




*Water Supply*



*Recreation*

*Aquatic Life*

State of Idaho
**Division of Environmental Quality**

# IDAHO STATEWIDE WORK PLAN FOR THE 1995 BENEFICIAL USE ATTAINABILITY AND STATUS RECONNAISSANCE SURVEY

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# TABLE OF CONTENTS

# INTRODUCTION

In 1972 Congress passed public law 92-500, Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA). The objective of this act is to "restore and maintain the chemical, physical, and biological integrity of the Nations's waters." The Federal Government, through the Environmental Protection Agency (EPA), assumed the dominant role in directing and defining water pollution control programs across the country. The act and the programs it spawned have changed significantly over the past 20 years as experience and perceptions of water quality have changed. The CWA has been amended 15 times since 1972, most significantly in 1977, 1981 and 1987. The Division of Environmental Quality (DEQ) is the state agency responsible for implementing the CWA in Idaho. EPA oversees Idaho and certifies that it is fulfilling the requirements and responsibilities of the CWA.

The 1977 and 1981 amendments primarily cover construction grants for municipal and industrial dischargers. The 1987 amendment reaffirmed State responsibility for implementing the CWA. It created § 319, nonpoint source assessment and development of management programs for state waters. It encapsulates much of what has been learned about nonpoint pollution sources and their control.

One of the national goals listed in the 1977 amendment is protection and management of waters to insure "swimmable and fishable" conditions. This coupled with the original 1972 objective of restoring and maintaining the chemical, physical and biological integrity relate water quality to more than just chemistry. The CWA recognizes the water quality triad, that water quality is made of three major components; (1) chemical (2) physical habitat, and (3) biology dependent on the former two. § 303 (c) (2) (B) of the CWA is even more explicit, "...such States shall adopt criteria based on biological monitoring or assessment methods.." § 304 (a) (1) goes further by stating, "State's shall develop and publish criteria for water quality accurately reflecting the latest scientific knowledge...on the effects of pollutants on biological community diversity, productivity, and stability, including information on the factors affecting rates of eutrophication and rates of organic and inorganic sedimentation for varying types of receiving waters."

Point source pollution was the first element addressed under the original 1972 CWA. This was done for several reasons, primarily because it was known municipal and industrial discharges were contributing a large portion of pollution loads to surface waters, and these point sources could be easily identified. Remediation and clean-up of these point sources was expensive and has resulted in significant improvements in the chemistry of waste water entering surface waters from point sources. Programs to control nonpoint source (NPS) pollution, however, were and remain today, largely unsuccessful because of the difficulties involved in applying point source approaches to diffuse NPS problems (Karr 1991). Karr also notes that efforts to measure or gauge water quality improvement have not been successful because of an inability to associate water quality standards with biological integrity. The realization that water quality standards do not always relate to biology and the complexities of NPS pollution, has lead water quality authorities to embrace the concept of ambient monitoring of biological integrity as being a direct, comprehensive indicator of ecological conditions.

Water quality standards are legally established rules consisting of two parts; designated uses and criteria. Designated uses are the purposes or benefits to be derived from a water body, and criteria are the conditions presumed to support or protect the designated uses (Karr 1991).

Pursuant to the 1972 CWA the State of Idaho enacted water quality standards, which are intended to protect designated beneficial uses and/or human health (IDAPA 16.01.02.003.04). Idaho beneficial uses include, but are not limited to:

Agricultural Water Supply
Domestic Water Supply
Industrial Water Supply
Cold Water Biota
Warm Water Biota
Salmonid Spawning
Primary Contact Recreation
Secondary Contact Recreation
Wildlife Habitat
Aesthetics

In 1993 DEQ embarked on a pilot program aimed at integrating biological and chemical monitoring with physical habitat assessment as a way of characterizing stream integrity; hence the quality of the water (McIntyre 1993). The first objective of the 1993 pilot program was to demonstrate the usefulness and feasibility of assessing water quality and ecological integrity by monitoring key chemical, physical and biological parameters. A second objective was to complete this monitoring as economically and quickly as possible. The project demonstrated that the two objectives could be met and the data collected could be employed in a variety of ways (Steed et al. 1994). Because of the success of the 1993 pilot, it was decided to expand the project statewide for 1994 (McIntyre 1994; and Steed and Clark 1995). A Technical Advisory Committee (TAC) was formed to evaluate the 1993 effort and arrive at a definitive work plan for 1994 (McIntyre 1994). The TAC was comprised of technically orientated personnel in each regional office and the central office. The 1995 Workplan has been developed based on the experiences of the past two years. The overall process remains unchanged, however, some modification of procedures and protocols has occurred in an effort to minimize qualitative information and increase accuracy in water quality assessments.

# PURPOSE OF STATEWIDE WORKPLAN

There are several purposes behind the Statewide Workplan. Some of the most important follow:

1. Provide consistency in the monitoring, data collection and reporting as required by Clark (1990).

2. The work plan must be applicable to any stream regardless of location/locality in Idaho.

3. Identify the principal measures that likely provide significant insight into stream ecology, biology, and water quality, and determine their relationship to beneficial uses.

# OBJECTIVES

The objectives of the Beneficial Use Reconnaissance Project are to:

1. <u>Determine beneficial use attainability to the extent possible at a recon level intensity</u>

2. <u>Determine beneficial use support status, which includes characterizing reference stream conditions</u>

## RATIONALE FOR STREAM SELECTION

Idaho has many diverse environments within its borders, thus criteria for selecting streams to monitor must be flexible enough to address the range of conditions encountered and yet be responsive to DEQ regional office and statewide requirements. To assist in prioritizing monitoring efforts the TAC identified six categories of streams that should be considered when the regional offices select streams for monitoring.

1. Water Quality Limited Streams

2. Streams with reference conditions (Plafkin et al. 1989; and Harrelson et al. 1994)

3. Watersheds (within the framework of the Watershed Approach, an emerging strategy within DEQ) (Monitoring and Technical Support Bureau 1994)

4. Streams for which we have little to no monitoring information

5. Stream Segments Of Concern (from Idaho Antidegradation policy)(Clark 1990)

6. Cumulative Effects Process Streams (IDL)

Streams that have been selected for monitoring in 1995 and the rationale for selection can be found in Appendix II.

# METHODS

## STREAM REACH SELECTION

In the BURP process, reaches can be thought of as "samples" of entire streams. Use attainability and beneficial use support status conclusions about large stream segments or entire streams are based on data collected in, relatively, small sample reaches (20 X stream width). The determination of beneficial use support status relies on making habitat and biotic data comparisons between study streams and reference streams. Consequently, sample reaches should be both **comparable** between streams and **representative** of the entire stream segment being assessed.

To make valid comparisons between study streams and those streams with reference conditions, sample reaches should be similar. For example, data collected in an "A" Rosgen stream type (steep, entrenched, cascading, step/pool stream) may not be compared to data from a "C" Rosgen stream type (low gradient, meandering, point-bar, riffle/pool, alluvial stream).

To be certain that conclusions can be applied to large stream segments or entire streams the sample reaches must be representative. Representative sampling can be accomplished by:

1) selecting several reaches that cover the variability of the stream segment or entire stream, or

2) selecting a few reaches that are the most representative of the stream segment or entire stream.

The DEQ Guidelines for Determining Beneficial Use Attainability and Support Status (draft document, October 6, 1994) recommends that BURP sites should not represent multiple stream orders. In other words if a stream has three orders, then at least one BURP reach per order must be established to determine use attainability and support status for the entire stream. Regional BURP Coordinators should consider both Rosgen stream type(s) and stream orders in choosing reaches for BURP crews to assess.

CORE PARAMETERS

The two BURP objectives are the basis for selection of monitoring parameters and methods. Parameters were selected that directly or indirectly related to the objectives listed above. Since attainability focuses on beneficial uses, many parameters relate directly to those uses, for instance, salmonid spawning and rearing, cold water biota, and primary and secondary contact recreation. Where use impact or status can not be evaluated directly, a surrogate measure was selected. In the case of beneficial use support, DEQ elected to use a multimetric comparison system similar to the one in Plafkin et al. (1989). A minimum number of measures and collections are needed to adequately characterize reference stream conditions to determine the level of use support, i.e., fully supported, impaired or not supported. Minshall (1993) also suggests using multiple measures because "it is unlikely that any one measure will have sufficient sensitivity to be useful in all circumstances".

The TAC reviewed similar projects in the Pacific Northwest as well as research studies for parameters and measures that yielded environmentally and biologically relevant information and or results. The objectives and relevant studies formed the sideboards the TAC used in selecting parameters for inclusion in this project. These methods became the core parameters (Table 1 and 2), and are parameters each Regional Office field crew will use throughout the state, regardless of their location. Each Regional Office may add additional parameters to meet site specific conditions or regional needs. These additions will be appended to this workplan by each Regional Office. The region specific workplan should include the parameters added and the protocol followed to collect the information to insure suitable interpretation of the data. Conquest et al. (1993) and Clark (1990) note that standardization of field methods is essential to ensuring reliable data and tailoring of published methods to site conditions is reasonable and valid.

The BURP process must accurately represent a stream reach and be cost effective. To insure that these purposes are met the BURP process is continuing to be refined. Two areas will be investigated this year to determine if the process can be made more accurate and cost effective (Table 3). Temperature is an important indicator of stream health and its ability to support its designated use. Because of the temporal changes in temperature of several temperature surrogates will be studied. These include canopy density, solar radiation, riparian height, flow and width/depth ratio. This first pilot study will be carried out by SWIRO. The second pilot study will investigate the possibility of performing sediment measures in the office by digitizing photo images of the substrate. This second pilot will be carried out by SCIRO. Measurement of substrate is a tedious and lengthy process. If an alternative method of substrate measurements can be developed it may save considerable time and money.

**Table 1.** 1995 Core Parameter List.

| Parameter | Method/ Definition | Level of Intensity |
|---|---|---|
| Flow | Harrelson et al. 1994 | One measure per site<br>Set interval method |
| Width/Depth | Bauer and Burton 1993. pg. 86 | Wetted and Bank full conditions. 3 pools and 3 riffles. Record X-sectional depth 10 times. Use habitat types and lengths to weight calculations for stream reach w/d ratio. |
| Shade | Bauer and Burton 1993. pg. 68 | Measure with a densiometer at three riffles and pools. Use habitat types and lengths to weight calculations for stream reach shade calculations. |
| Bank Stability | Bauer and Burton 1993. pg. 98 | Longitudinal (total stream reach length) for both stream banks. |
| Substrate | Wolman 1954 | At three riffles, a minimum of 100 counts per riffle. |
| Habitat Types | Meehan 1991 | Longitudinal. Classify as Pool, glide, run, riffle. |
| Pool Complexity | Bauer and Burton 1993. pg 119 | Max pool depth, width, cover and depth at pool tail-out. Do not score but collect measurements. Measurements will be taken at 3 pools. |
| Large Organic Debris | Platts et al. 1987. pg. 83 | In forested situations only. LOD > 10 cm diameter and >1 m in length, within bankfull zone of influence. |
| Stream Channel Classification | Rosgen 1994 | To letter classification only. |
| Habitat Assessment | Hayslip 1993 | |
| Temperature | Fransen 1992 | Thermometer or thermocoupler device calibrated against NIST-certified thermometer. Some commercial thermometers may be as much as 3° in error. |
| Photopoints | | Photo records of the site will be recorded. Each BURP crew should have a date back camera. The GPS location of the photo, and direction facing, in degrees, will be recorded. The photos will be developed into slides and digital format. |

**Table 2.** Biological parameters, methods and modifications for 1995 surveys.

| | Method | Modification/Criteria |
|---|---|---|
| Macroinvertebrates | IDEQ #5-Protocols for assessment of macroinvertebrates in Idaho Streams (Clark and Maret 1993). | Hess sampler, w/500 $\mu$m mesh at three successive riffles (n=3). The samples will be preserved and store separately in the field. Lab personnel will composite the three samples and count and identify the first 500 individuals. Surber samplers will be used if conditions do not permit the use of a Hess sampler. |
| Fish | IDEQ #6-Protocols for assessment of fish in Idaho streams (Chandler et al. 1993). | Collect fish until two size classes or young of year of non-stocked indicator species have been collected or the entire reach has been surveyed. |

**Table 3.** Pilot investigations for 1995 to investigate the potential for adding procedures and/or modifying the existing core parameter list.

| | |
|---|---|
| Riparian Width and Height<br>Solar Pathfinder<br>Densiometer<br>Continuous temperature log | Comparison of various measures to determine which technique correlates best to actual water temperature. |
| Digitized sediment measurements | Use digitized photos or Photoman and computer software to calculate sediment measures in the office rather than in the field. |

## RATIONALE FOR PARAMETER SELECTION AND SUMMARY OF PROCEDURE

*Flow*

Minshall (1993) noted that flow was one of the principal abiotic factors shaping stream ecosystems. Nelson et al. (1992) found flow to be one of the physical attributes that distinguished streams from different geologic regions. Flow is one of a series of measurements taken by both Oregon and Washington in very similar bioassessment projects (Mulvey et al. 1992, Plotnikoff 1992).

Locate a straight non-braided stretch of your sampling reach. Place a measuring tape across the stream perpendicular to the flow. Take appropriate number of velocity measures evenly spaced from wetted bank to wetted bank. Record the horizontal distance measured from tape, depth and velocity. All BURP crews will have a electromagnetic velocity meter and a top-setting wading rod.

*Width/Depth*

Widths, depths and width to depth ratios were found by Robinson and Minshall (1992, 1994) to be useful in discriminating streams between ecoregions in Idaho. Nelson et al. (1992) and Overton et al. (1993) also found widths and depths to be important variables in separating streams from different geologic regions and with different degrees of management respectively.

Measure the bankfull width and depth as well as the wetted perimeter width and depth. Width depth ratios will be taken at three riffles and pools if possible. Record cross sectional depths at ten intervals across stream.

*Shade*

Canopy cover is a surrogate for water temperature, since vegetation controls the amount of sunlight reaching the stream (Platts et al. 1987). Canopy cover was found to be an important variable in studies by Mulvey et al. (1992) and Overton et al. (1993). Temperature and canopy cover helped explain differences in fish occurrence and abundance in these studies as well as in the Robinson and Minshall (1992, 1994) ecoregion study.

Each BURP crew will use a densiometer to determine vegetative cover. The number of the 17 intersections obstructed will be recorded. Densiometer readings will be taken at three pools and riffles. For stream orders 1-4 four readings will be taken per cross section, 1) right bank, 2) left bank, and from the center of the stream 3) upstream and 4) downstream.

*Substrate*

Substrate is an important indicator of fish and macroinvertebrate microhabitat. The Wolman pebble count characterizes stream bottom substrates (Wolman 1954). This method will enable DEQ to make quantitative judgements on percentages of fines (defined as material <6.35 mm Chapman and McLeod 1987), gravel, cobble and boulder. Fine sediment and availability of living space have direct impact on both fish and insects (Marcus et al. 1990, Minshall 1984). Several studies and state projects have found relative substrate size to be important indicators of water quality impacts due to activities in the watershed (Overton et al. 1993, McIntyre 1993, Skille 1991).

The pebble count has been modified to take substrate measurements at riffles only. The pebble count begins at bankfull stage on one bank and proceeds to the same stage on the other side of the stream. The observer paces across the transect and at each step reaches down to the tip of his/her boot with his/her index finger. The first particle encountered by the index finger is picked up and the intermediate diameter (Dm) is measured. A total of three riffles with 35 measurement per riffle is required.

*Habitat Types (Pools, Glides, Runs, Riffles)* (Meehan, 1991)

The amount of various habitat types in a reach of stream is an indicator of the availability of habitat for fish (Reiman and McIntyre 1993). Spawning typically takes place at pool tailouts in the transition between pool and riffles. However, as fish grow pools become more important as areas for rearing.

The length of each of the four habitat types will be measured.
**Riffle** - Shallow section of a stream with rapid current and a water surface broken by gravel, rubble or boulders.
**Run** - Swiftly flowing stream reach with little surface agitation and no major flow obstructions. Often appears as a flooded riffle.
**Glide** - Slow, relatively shallow stream section with water velocities of 10-20 cm/s (0.3-0.6 ft/s) and little or no surface turbulence.
**Pool** - Portion of a steam with reduced current velocity, often with deeper water than surrounding areas and with a smooth surface.

*Pool Complexity*

This is a measure of pool quality, where pool riffle ratio is a measure of pool quantity. In a study of streams that differed by the amount of management in their respective watersheds, Overton et al. (1993) found pools in the less impacted stream/watershed were more frequent, had higher volumes and greater depths than those in the more managed stream/watershed. Beschta and Platts (1986) suggest that the quality of pools is equally as important as the number of pools in describing a healthy stream from a fisheries stand point.

Pool complexity will be measured at three pools. The crews will measure depth, substrate, overhead cover, submerged cover and bank cover.

*Large Organic Debris also called Large Woody Debris*

Large Organic Debris (LOD) has been found important in smaller sized streams where the riparian zone is made up of evergreens, i.e., forested situation (Everest et al. 1987). LOD has been found to be important for the complexity it adds to stream habitat, retention of allochtonous matter and sediment, and stability it imparts to streams under high flow conditions. Some species of salmonids show a high affinity for LOD (Rieman and McIntyre 1993).

In forested situation LOD will be measured. All organic material greater than 10 cm in diameter and longer than 1 m will be counted within a stream reach.

*Photopoints*

Photographic records of streams can be invaluable to determine changes through time of riparian conditions, and stream channel modifications.

The BURP crews will be supplied with slide film, dateback camera and a compass. The photopoint location will be recorded using GPS and distance and azimuth from an easily identifiable landmark. The direction facing when taking the photo will also be recorded. The film will them be sent to Seattle Film Works (SFW) of Seattle, WA. SFW will return slides, digitized photos on disk and a replacement role of film.

*Macroinvertebrates*

Macroinvertebrates are an essential part of the BURP process. The biological community of a stream reflect overall ecological integrity. Because most streams are monitored infrequently, chemical monitoring is not always representative of the long term condition of the stream. Because the biologic community is exposed to the stream's condition over a long period of time, it provides an integrated representation of water conditions and thereby allowing better classification of the stream's condition and support status.

Macroinvertebrate samples will be collected from three separate riffles following Clark and Maret (1993). Each of the three samples will be preserved separately for lab compositing. The first 500 individuals will be counted and identified.

*Fish*

Much of the same reasoning for sampling macroinvertebrates applies to fish as well. Fish give a long term indication of stream condition.

Prior to field collection:

1. Literature search

2. Information search via regional Idaho Department of Fish and Game for salmonid spawning and stocking activity on targeted

streams. If applicable, may also check with the USFS, USFWS, BLM, tribes and other agencies or Universities as appropriate.

CORE METHODS (Chandler et al. 1993):

* If electrofishing on the same date as other habitat measurements are taken, electrofish in the closest representative stream reach upstream of where the habitat measures were taken.
* One pass, no block nets
* Collect fish until <u>two size classes</u> or <u>young of year</u> of non-stocked indicator species of salmonids have been collected or the appropriate length of stream has been surveyed, whichever comes first.
* Collect and count all species.
* Voucher at least three specimen of each species at each site as permit allows. Voucher according to addendum to IDEQ Protocol #6.
* Measure "representative" number of each size class of salmonids.
* Record time spent conducting fish collection pass on stream reach.
* Note habitat types sampled within the reach.
* Note length of stream segment electrofished.

OPTIONAL:

* Study reach covers all available habitat types.
* Weight of salmonids which have been measured.

In addition to the above rational for parameter selection the TAC was equally concerned with the reliability, variability and repeatability of measurements. Platts et al. (1983) evaluated the accuracy and precision of some of the parameters listed above. Some were found to have lower confidence intervals than others, especially if they were <u>rated</u> as opposed to measured, though measured parameters had problems as well. They found measurements for stream width and depth to have good to excellent precision and accuracy. Subjective measures of percent pool and pool quality had good to fair precision, but generally fair to poor accuracy. Hogle et al. (1993) found ratings and measured values for streambank characteristics to have the highest variability in their study on the precision of habitat measurements. They concluded more quantitative definitions and measurements would reduce the variability associated with subjective ratings. Furthermore, Roper and Scarnecchia (1995) report on "observer variability" in doing habitat surveys. In light of these the TAC selected quantitative measures wherever possible rather than subjective ratings.

Streams in Idaho exhibit considerable variability with regard to their climates, hydrology, geology, landforms, and soils. Recognizing this the TAC elected to use Rosgen's (1994) Stream Classification System as a means of organizing and stratifying streams for comparison. As Conquest et al. (1993) noted, "One way to organize an inherently variable landscape is to employ a system of classification. The general intent of the classification (scheme) is to arrange units into meaningful groups in order to simplify sampling procedures and management strategies." Additional descriptive items will be collected in the field and in the office before and after the assessment is made. The additional information collected will include:

| | |
|---|---|
| Distance from headwaters | Size of Drainage |
| Mean daily air temp (NOAA) | Soil Type |
| Latitude | Valley Type |
| Longitude | Aspect |
| Altitude | Lithology |
| Slope | |
| Stream Order | |

**PROCEDURE SEQUENCE FOR SITE EVALUATION**

What follows is an example of how a crew might proceed once they have selected a representative sampling site.

1) Crew determines the appropriate site and length of stream to survey according to the following criteria:

   a. if wetted width of stream is <5 m do a minimum of 100 m

   b. if wetted width of stream is >5 m do a minimum of 20 times bankfull width

2) Crew member measures out appropriate distance and marks beginning and ending points with flagging making sure to stay out of stream.

3) Record GPS coordinates, photopoint and map location.

4) Descriptive cover sheet information is filled out i.e. stream slope, crew members, weather, location relative to some reference landmark, general observations.

5) A discharge measurement is taken. Choose a spot with a relatively straight channel and uniform flow, where possible.

6) Locate first riffle upstream from beginning point, proceed to riffle.

7) Randomly select location for macroinvertebrate sample by stretching tape across stream and using a random number for location.

8) Place Hess sampler at point determined above. Take invertebrate sample. Place sample into a jar, label inside and out, and preserve with 70% ethanol (at least 1/2 to 3/4 of Whirl-pack or mason jar should be ETOH). <u>If container is greater than 50% full it should be rinsed with ETOH 2 or 3 times within 24 hours.</u>

9) Perform a Wolman pebble count immediately upstream from insect sample. <u>Wolman pebble counts will be taken from high water mark on one side to the high watermark on the opposite side of the stream</u>. Proportion counts so that a minimum of 100 pebbles are taken from the entire channel cross section. In smaller streams this may mean stepping above the first Wolman transect and conducting another pass. This may be necessary to repeat several times on very narrow streams. On wide streams 100 pebbles might be counted before the transect is complete. In this case the count should be continued to the high water mark.

10) Once finished with the Wolman pebble count, proceed to measure wetted and bankfull widths and depths. Record the width and depth at ten points on the cross-section. A mean width/depth ratio will be determined in the office.

11) Take canopy closure (shade) measurement at riffle site where insect sample was collected. Measure at right and left bank, in the middle of stream facing upstream and another facing down stream.

12) Proceed to a mid-reach riffle and repeat procedures 7 through 11 above.

13) Proceed to upper-reach riffle and repeat 7 through 11 again.

14) Conduct habitat type measurements by measuring and characterizing as either pool, riffle, run, or glide for the entire length. Express this on the field sheets by percent of total length surveyed.

15) Conduct bank stability survey by rating each bank for the 4 different categories noted on the field sheets; covered and stable, covered and unstable, uncovered and stable, uncovered and unstable. Express as percentages. Use the tape that was used for obtaining the riffle pool measurement or use a 2 m pole.

16) If fish sampling is to be done proceed further upstream where no disturbance has occurred, or return in a few days to allow fish to re-establish their territories.

# QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) is critical to the success of any scientific study. We employ QA/QC into the total project from experimental design, work plan development, training, sampling, laboratory, data analysis to reporting the data. The quality of field data can be expressed in terms of precision, accuracy, representativeness, comparability and completeness. The BURP process has incorporated some basic procedures to assure that data meet all of these quality assurance measures.

*Precision.* Precision describes the reproductibility among individual measurements of the same property. For example, two measurements of discharge on the same stream at the same time can be very similar (precise) or very different (imprecise). The degree of precision depends on many factors including instrument error, data recording error, site selection, technique/method differences, etc. The BURP process maximizes precision by using the "double check" for errors and completeness on all field data before they are sent to data entry. Training in the use of equipment and sample collection/measurement decreases sampling error and increases precision. Since the first BURP effort in 1993 the protocol have been revised to maximize quantitative data collection and minimize qualitative ratings in an effort to improve precision.

In 1995, the Central Office Technical Team will assess the overall precision of the BURP process by organizing different BURP crews to assess an assigned stream during the same week. Precision will be considered acceptable if use attainability and support status conclusions based on different data sets are the same. If conclusions drawn from the data are found not to be the same then the Team will review and consider making changes in: reach selection criteria, number of reaches sampled, number of samples taken, methods and techniques, etc. This test of precision does not quantify specific sources of variation but it can give insight into areas of greatest variation and error.

*Accuracy.* Accuracy (often confused with precision) expresses the closeness of measurements to a "true" value. The BURP process enhances accuracy through replication of sampling reaches within streams and riffles within reaches. Voucher specimens for macroinvertebrates and fish are critical to assure accuracy of field and lab identifications. The laboratory QA/QC plan for macroinvertebrate handling and identification is also an assurance of accuracy.

*Representativeness.* Representativeness is achieved when samples or measurements are collected at such locations and in such a manner as to result in data reflecting the media sampled or measured. In other words, pool depth must be measured in pools, riffle lengths must be measured on the riffles, and the habitat measures should be representative of entire streams or stream segments, not a-typical reaches. The BURP reach selection criteria are designed to assure that measurements are representative. Annual training of BURP crews is essential to control location and manner of data collection.

*Comparability.* Comparability is the measure of confidence with which one data set can be compared to another when generated at different times and places by different scientists using the same procedures. In other words all BURP crews must be using the same "yardsticks". For example, habitat measures determined by each of the seven BURP crews working independently should be considered equivalent in regard to measurement. The BURP process achieves comparability in the following ways:

- working under one state workplan which describes standardized methods, protocol, and field forms
- standardized training of crews coordinated by a Central Office Technical Team
- quality control field visits by a Central Office Technical Team
- repair, upgrade, and calibration of monitoring equipment

*Completeness.* Completeness is a qualitative QA component that describes how well the data collection meets the objectives of the study. In other words, is each measurement relevant in answering specific objective questions and will all questions be answered by the data? Completeness is continually evaluated by the BURP Technical Review Committee and by Workplan review by interest groups outside DEQ. Completeness is also controlled through use of equipment check-off lists reviewed before leaving for the field, measurement check-off lists reviewed before leaving sampling sites, and double checking field data before sending to data entry.

**BURP CREW TRAINING**

Field crew training is a critical quality assurance/quality control element in the BURP process. It is the "common thread" between all BURP crews and helps to insure that:

- Regional BURP Coordinators are well versed on all aspects of the workplan and the BURP process
- all crews are using the same methods/protocol
- data collected by new crews is comparable to data collected by previous crews
- veteran crews are fully informed of changes and upgrades in protocol

During the first two years of the BURP process (1993-94), the Central Office Technical Team and the Regional Office Coordinators worked together to train each BURP crew. Training took place at five or six regional locations over one to two days each. In 1995, training in each region will be more independent of Central Office assistance and somewhat more "customized" to the needs of the regions for these reasons:

- Central Office Technical Team will focus efforts on training of the regional coordinators

- regional training needs (intensity and duration) vary with experience of crews and coordinators
- regional training responsibility encourages coordinators to maintain an active role in the process

The Central Office Technical Team will organize an intensive training workshop for the Regional Coordinators. This will include all aspects of the BURP process from hands-on field methods to data analyses and interpretation. The objectives of this training will be a) to provide the coordinators with all the training tools they need to independently train their regional BURP crews and b) to assure statewide consistency in methods and procedures. This training is scheduled for May 15-19, 1995.

Following the Coordinators' Workshop, the Regional BURP Coordinators will train their respective crews. The regional training will cover all aspects of the BURP process whether training is a refresher for veteran crews or first time for new crews. Training will provide a chance for hands-on experience in each method for each BURP crew member. Regional training will require at least two days including a minimum of one-day classroom and one-day field experience. Past training evaluations indicate that time spent measuring each parameter is more important than time spent visiting several reaches or streams. Regions are encouraged to work together to provide training and can request help from the Central Office Technical Team. Because training is an ongoing process, Regional Coordinators or their representatives should accompany BURP crews at least one day per week of field work as a check on performance and to provide additional "on-the-job" training.

Beginning in 1995, all BURP crew members, Regional Coordinators, and Central Office Technical Team staff will be trained and certified in cardio-pulmonary resuscitation (CPR). This requirement will increase safety during electrofishing, training, and BURP field work. BURP crews can be trained by DEQ "inhouse" or certification can be a hiring requirement.

## FIELD REVIEWS

The Central Office Technical Team accompanied by the appropriate Regional Coordinator will make a periodic field visit to each region. For schedule see June calendar below. These field reviews are intended to be a check on the thoroughness and statewide consistency as well as an important part of continued training. The review team will spend one to two days with each Region observing the work, making suggestions for improvement, and providing refresher training.

At the end of each field review the Central Office Technical Team will conduct a debriefing session, including suggestions for improvement and need for additional training.

| SUN. | MON. | TUE. | WED. | THURS. | FRI. | SAT. |
|---|---|---|---|---|---|---|
| JUNE 1995 | | | | 1 | 2 | 3 |
| 4 | 5 EIRO | 6 EIRO | 7 | 8 SEIRO | 9 SEIRO | 10 |
| 11 | 12 | 13 SWIRO | 14 SWIRO | 15 SCIRO | 16 * SCIRO | 17 |
| 18 | 19 NIRO | 20 NIRO | 21 | 22 NCIRO | 23 NCIRO | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 * | |

* Denotes dates that data sheets will be mailed to Central Office.

Starting this year a second field review will be performed in July by another regional coordinator accompanied by the reviewees regional coordinator. See July calendar for the second field review.

| SUN. | MON. | TUE. | WED. | THURS. | FRI. | SAT. |
|---|---|---|---|---|---|---|
| JULY 1995 | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 EIRO | 12 EIRO | 13 SWIRO | 14 * SWIRO | 15 |
| 16 | 17 | 18 SEIRO | 19 SEIRO | 20 NIRO | 21 NIRO | 22 |
| 23/30 | 24/31 | 25 SCIRO | 26 SCIRO | 27 NCIRO | 28 * NCIRO | 29 |

# DATA HANDLING AND MANAGEMENT

BURP crews will enter field data on pre-printed data forms and double check for completeness, accuracy, and readability. This check must be done in the field, and one BURP crew member will be assigned this responsibility. The Regional BURP Coordinator is responsible for checking (a second time), copying, sending the copied data sheets to the Central Office for data entry, and filing the originals in the regional office. "Check-off" or "initialing" boxes will be added to field forms for this purpose. To prevent "bottle necking" of data in the Central Office, regions will send data at every other Friday starting June 16, 1995.

Beginning in 1995, water body names used in BURP site identification must correspond to the names listed in U.S. Geological Survey (1995). This will help to standardize the spelling of stream names. Central Office will provide copies of this document to Regional BURP Coordinators.

Data processing begins when data sheets are received by the MTSB staff and logged into the data log book. Stream and habitat data are entered into the new BURP database developed by Monitoring and Technical Support staff. Data Entry staff has entered 1994 data into this program. The 1993 and 1994 macroinvertebrate data have been entered into the Taxon program. The Central Office Technical Team will be responsible to update the Taxon Code list.

Due to the quantity of BURP data collected in 1994, Monitoring and Technical Support staff created a new data base which incorporates the habitat data base and does not require as large an amount of memory. Beginning with 1995 data, the Data Entry staff will be using this new program.

As part of data QA/QC, the Environmental Information Systems Bureau (EISB) has developed a check on accuracy and completeness of data forms. If the Data Entry staff finds mistakes or incomplete fields on the data forms, the forms are marked and sent back to the Monitoring and Technical Support Bureau to coordinate corrections. Corrections are made and forms are returned to the EISB Data Entry staff to finish entering the data.

After all data have been entered, the Data Entry staff check the data from a hard copy, and make any necessary corrections. The data sheets are then returned to the Monitoring and Technical Support, and if corrections were made on the data sheets copies are sent to the regional coordinator.

# DATA ANALYSES AND INTERPRETATION

The BURP field crews are responsible for collecting information and data necessary to make beneficial use attainability and use support status decisions. The interpretation and analyses of the data/results will be done by Regional BURP Coordinators with assistance and support from Central Office Technical Team. Maret and Jensen (1991) will be the basis for beneficial use attainability determinations. This protocol has been modified by the BURP Technical Committee to remove limited cold water and limited warm water biota use classification for simplicity and speed. The three use classifications that will be decided upon based on BURP data are: 1) cold water biota, 2) salmonid spawning, and 3) warm water biota. If fisheries information is not available, determinations of cold water biota will be based on the macroinvertebrate community make-up and the presence or absence of cold water indicator species. The BURP process will use a multimetric approach procedure similar to the one described in Plafkin et al. (1989) for determining use support status.

DEQ's Monitoring and Technical Support staff have developed Guidelines for Determining Beneficial Use Attainability and Support Status (draft report, October 6, 1994). These guidelines spell out the data and processes needed to determine attainability and support status.

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# Appendix I.  FIELD EQUIPMENT CHECK LIST

| EQUIPMENT DESCRIPTION | YES | NO |
| --- | --- | --- |
| **MACROINVERTEBRATE SAMPLE EQUIPMENT:** | | |
| Hess and Surber Sampler (500$\mu$m mesh w/250 ml bucket) | | |
| White pans | | |
| Kick nets | | |
| Macro sample containers | | |
| Preservative (70% ETOH) | | |
| Spare nets for Samplers | | |
| Scrub brush | | |
| Wash (squirt) bottles for rinsing (water and alcohol) | | |
| Field labels | | |
| Field Data forms | | |
| Rubber gloves | | |
| Forceps | | |
| Pencils/Indelible alcohol proof markers | | |
| **ELECTROFISHING EQUIPMENT:** | | |
| Electrofisher | | |
| Anode and Cathode | | |
| Dip nets | | |
| Waders | | |
| Rubber gloves (shoulder length) | | |
| Specific Conductivity Meter | | |
| Preservative: 10% buffered formalin solution | | |
| Scales (weight (springs) & length) | | |
| Thermometer | | |
| Collecting Permit or IDFG personnel | | |
| Anesthetic | | |

| EQUIPMENT DESCRIPTION | YES | NO |
| --- | --- | --- |
| Buckets | | |
| Gas/oil | | |
| Generator (if using a battery powered electrofisher) + spare parts | | |
| Specimen vouchering containers | | |
| Fish measuring board | | |
| Fish identification keys | | |
| Clipboard/notebook/fish labels | | |
| Field data sheets | | |
| **CONTINUED ELECTROFISHING EQUIPMENT:** | | |
| First Aid Kit | | |
| Polarized sunglasses | | |
| Fire extinguisher | | |
| CPR Certification | | |
| **WOLMAN PEBBLE COUNT EQUIPMENT:** | | |
| Metric ruler (clear plastic) or angled measuring device listed in Protocol #2 | | |
| Shoulder length gloves | | |
| Pencils/pens | | |
| Field data sheets | | |
| **FLOW MEASUREMENT EQUIPMENT:** | | |
| Flow Meter | | |
| Top-setting-wading flow rod | | |
| 100 ft. measuring tape (minimum length) | | |
| Rebar stakes | | |
| Flow sheets | | |
| Pencils/clipboard | | |
| Waders | | |
| Extra batteries for flow meter | | |

| EQUIPMENT DESCRIPTION | YES | NO |
| --- | --- | --- |
| **MISCELLANEOUS EQUIPMENT:** | | |
| Densiometer | | |
| 2 meter rod | | |
| Polarized sunglasses | | |
| Tape measures | | |
| Random number table | | |
| Field notebook/clipboards | | |
| Maps | | |
| "All" forms and labels | | |
| Sunscreen | | |
| Camera & film | | |
| Extra batteries | | |
| Emergency equipment for vehicle | | |
| First aid kit | | |
| GPS receiver | | |
| Workplan | | |
| Protocols | | |
| Tool Kit | | |
| Pens/pencils | | |

# Appendix II. STREAMS PROPOSED FOR MONITORING IN 1995 BY REGION

| South Eastern Idaho Regional Office | | |
|---|---|---|
| **Stream Name** | **PNRS #** | **River Reach #** |
| Giraffe Creek | 277 | |
| Preuss Creek | 275 | |
| Dry Creek | 276 | |
| Beaver Creek | 281 | |
| Co-op Creek | 259 | |
| Pearl Creek | 257 | |
| Stauffer Creek | 258 | |
| Cottonwood Creek | 245 | |
| Densmore Creek | 249 | |
| Trout Creek | 247 | |
| Williams Creek | 246 | |
| Battle Creek | 240 | |
| Mink Creek | 244 | |
| Weston Creek | 238 | |
| Malad River | 285 | |
| Little Malad River | 292 | |
| Samaria Creek | 289 | |
| Pocatello Creek | 331 | |
| Rapid Creek | 334 | |
| Gibson Jack Creek | 332 | |
| Goodenough Creek | 335.03 | |
| Hawkins Creek | 337 | |
| Bell-Marsh Creek | 335.02 | |
| Birch Creek | 338 | |
| Timothy Creek | 317 | |
| Bacon Creek | 316 | |
| Angus Creek | 313 | |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Dry Valley Creek | 314 | |
| Kendall Creek | 319 | |
| Meadow Creek | 310 | |
| Trail Creek | 311 | |
| Rawlins Creek | 307 | |
| Sage Creek | 227 | |

| South Central Idaho Regional Office | | |
|---|---|---|
| **Stream Name** | **PNRS #** | **River Reach #** |
| Alpheus Creek | 405 | |
| Big Wood River | 475 | |
| Big Wood River | 476 | |
| Big Wood River | 477 | |
| Big Wood River | 478 | |
| Big Wood River | 479 | |
| Big Wood River | 481 | |
| Big Wood River | 482 | |
| Big Wood River | 483 | |
| Blind Canyon Creek | 289 | |
| Camas Creek | 190 | |
| Camas Creek | 191 | |
| Clear Springs | 395 | |
| Clover Creek | 379 | |
| Cottonwood Creek | 471 | |
| Croy Creek | 491 | |
| Crystal Springs | 298 | |
| Dry Creek | 408 | |
| Dry Creek | 521 | |
| Ellison Creek | 399 | |
| Fish Creek | 522 | |
| Fish Creek | 523 | |
| Raft River | 431 | |
| Little Wood River | 512 | |
| Little Wood River | 513 | |
| Little Wood River | 511 | |
| Riley Creek | 385 | |
| Rock Creek | 487 | |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Rock Creek | 400 | |
| Rock Creek | 365 | |
| Rock Creek E. Fk. | 366 | |
| Rock Creek | 400 | |
| Salmon Falls Creek | 458 | |
| Shoshone Creek | 466 | |
| Thousand Springs Creek | 386 | |
| Thorn Creek | 485 | |
| Rock Creek | 487 | |
| Seamans Creek | 489 | |
| Slaughterhouse Creek | 490 | |
| Croy Creek | 491 | |
| Quigley Creek | 492 | |
| Indian Creek | 493 | |
| Greenhorn Gulch Creek | 495 | |
| Wood River E. Fk. | 496 | |
| Wood River E. Fk. | 497 | |
| Lake Creek | 502 | |
| Fox Creek | 503 | |
| Eagle Creek | 504 | |
| Boulder Creek | 506 | |
| Baker Creek | 507 | |

| Eastern Idaho Regional Office | | |
|---|---|---|
| **Stream Name** | **PNRS #** | **River Reach #** |
| Willow Creek | 35 | 17040205 |
| Willow Creek | 37 | 17040205 |
| Willow Creek | 38 | 17040205 |
| Willow Creek | 39 | 17040205 |
| Meadow Creek | 40 | 17040205 |
| Tex Creek | 41 | 17040205 |
| Grays Lake | 43 | 17040205 |
| Grays Lake Outlet | 44 | 17040205 |
| Hell Creek | 45 | 17040205 |
| Corral Creek | 48 | 17040205 |
| Badger Creek | 143 | 17040217 |
| Deer Creek | 144 | 17040217 |
| Big Lost River | 161 | 17040218 |
| Spring Creek | 167 | 17040218 |
| Wet Creek | 145 | 17040217 |
| Dry Creek | 146 | 17040217 |
| Camas Creek | 191 | 17040214 |
| Beaver Creek | 193 | 17040214 |
| Beaver Creek | 194 | 17040214 |
| Birch Creek | 154 | 17040216 |
| Big Lost River | 164 | 17040218 |
| Salmon River | 1011 | 17040201 |
| Salmon River | 1010 | 17040201 |
| Salmon River | 1009 | 17040201 |
| Challis Creek | 1013 | 17040201 |
| Garden Creek | 1017 | 17040201 |
| Warm Springs Creek | 1019 | 17040201 |
| Yankee Fork | 1036 | 17040201 |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Yankee Fork | 1035 | 17040201 |
| Jordan Creek | | 17040201 |
| Valley Creek | 1040 | 17040201 |
| Stanley Lake Creek | 1042 | 17040201 |
| E Fork Big Lost River | 179 | 17040218 |
| E Fork Big Lost River | 180 | 17040218 |
| Sheridan Creek | 96 | 17040202 |
| Icehouse Creek | 103 | 17040202 |
| Camas Creek | 190 | 17040214 |
| Sawmill Creek | 148 | 17040217 |
| Panther Creek | 967 | 17040203 |
| Bucktail Creek | 952 | 17040203 |
| Big Deer Creek | 972 | 17040203 |
| Blackbird Creek | 977 | 17040203 |
| Geertson Creek | 1063 | 17040204 |
| Bohannon Creek | 1065 | 17040204 |
| Wimpey Creek | 1067 | 17040204 |
| Sandy Creek | 1070 | 17040204 |
| Kenny Creek | 1072 | 17040204 |
| McDevitt Creek | 1077 | 17040204 |
| Mill Creek | 1082 | 17040204 |
| Morse Creek | 1106 | 17040202 |
| Little 8 Mile Creek | 1084 | 17040204 |
| Big 8 Mile Creek | 1086 | 17040204 |
| Big Timber Creek | 1090 | 17040204 |
| 18 Mile Creek | 1093 | 17040204 |
| Hawley Creek | 1095 | 17040204 |
| Pahsimeroi River | 1100 | 17040202 |
| Pahsimeroi River | 1099 | 17040202 |
| Patterson Creek | 1102 | 17040202 |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Big Creek | 1110 | 17040202 |
| Moody Creek | 119 | 17040204 |
| Teton River | 113 | 17040204 |
| Teton River | 118 | 17040204 |
| Teton River | 117 | 17040204 |
| Teton River | 116 | 17040204 |
| Bitch Creek | 123 | 17040204 |
| Teton Creek | 132 | 17040204 |
| Badger Creek | 125 | 17040204 |
| Spring Creek | 127 | 17040204 |
| Leigh Creek | 128 | 17040204 |
| Packsaddle Creek | 129 | 17040204 |
| Horseshoe Creek | 130 | 17040204 |
| Darby Creek | 134 | 17040204 |
| Fox Creek | 136 | 17040204 |

| Northern Idaho Regional Office | | |
|---|---|---|
| **Stream Name** | **PNRS #** | **River Reach #** |
| Deep Creek | 1368 | 1701010402800 |
| Deep Creek | 1368 | 1701010402900 |
| Deep Creek | 1368 | 1701010403100 |
| Deep Creek | 1368 | 1701010403300 |
| Deep Creek | 1368 | 1701010403301 |
| Deep Creek | 1368 | 1701010403304 |
| Snow Creek | 1370 | 1701010405300 |
| Twenty Mile Creek | 1373 | 1701010403400 |
| Boundary Creek | 1390/1389 | |
| Blue Joe Creek | 1392 | 1701010405000 |
| Moyie River | 1395 | 1701010500100 |
| Meadow Creek, E.Fork | 1399 | |
| Cow Creek | | 1701010400700 |
| Cow Creek | | 1701010400800 |
| Myrtle Creek | 1377 | 1701010402201 |
| Ruby Creek | 1372 | 1701010403000 |
| Ball Creek | 1379 | 1701010402000 |
| Caribou Creek | | 1701010402501 |
| Priest River | 1407 | 1701021500600 |
| Priest River | 1407 | 1701021500202 |
| Priest River | 1407 | 1701021500201 |
| Priest River | 1407 | 1701021500200 |
| Priest River | 1407 | 1701021500100 |
| Binarch Creek | 1418 | 1701021507500 |
| East River[L] | 1415 | 1701021500400 |
| East River[L] | 1415 | 1701021500500 |
| Lamb Creek | 1419 | 1701021505900 |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Reeder Creek | 1424 | 1701021508101 |
| Tango Creek | 1428 | 1701021508001 |
| Kalispell Creek | 1421 | 1701021505800 |
| Priest River, Lower W. Branch | 1411 | 1701021506300 |
| Priest River, Lower W. Branch | 1411 | 1701021506500 |
| Lion Creek | 1430 | 1701021503400 |
| Hughes Fork | 1433 | 1701021504700 |
| Hunt Creek | 1422 | 1701021507701 |
| Granite Creek | 1426 | 1701021504900 |
| Indian Creek[L] | 1423 | 1701021502500 |
| Big Creek[L] | 1414 | 1701021506900 |
| Caribou Creek[L] | 1431 | 1701021503700 |
| Hoodoo Creek | 1440 | 1701021400300 |
| Hoodoo Creek | 1441 | 1701021400500 |
| Cocolalla Creek | 1442 | 1701021400700 |
| Caribou Creek | 1458 | 1701021406900 |
| Johnson Creek | 1472 | 1701021311700 |
| Lightning Creek | 1473 | 1701021311204 |
| Lightning Creek | 1473 | 1701021311203 |
| Lightning Creek | 1473 | 1701021311201 |
| Lightning Creek | 1473 | 1701021311200 |
| Lightning Creek | 1473 | 1701021311000 |
| Lightning Creek, E. Fk. | | 1701021311100 |
| Porcupine Creek | | 1701021312400 |
| Rattle Creek | | 1701021312100 |
| Spring Creek | 1475 | 1701021312500 |
| Wellington Creek | 1476 | 1701021312300 |
| Twin Creek | 1478 | 1701021311900 |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Grouse Creek, N.Fork | | 1701021404200 |
| Sand Creek | 1446 | 1701021404901 |
| Pack River | 1449 | 1701021404300 |
| Pack River | 1449 | 1701021403701 |
| Pack River | 1449 | 1701021403700 |
| Schweitzer Creek | 1447 | 1701021407000 |
| Wolf Lodge Creek | 1541 | 1701030306900 |
| Wolf Lodge Creek | 1541 | 1701030307100 |
| Rockford Creek | 1548 | 1701030302900 |
| Rockford Creek | 1548 | 1701030303100 |
| Big Creek | 1602 | 1701030412900 |
| Big Creek | 1602 | 1701030413000 |
| Marble Creek | 1605 | 1701030408100 |
| Marble Creek | 1604 | 1701030407600 |
| Marble Creek | 1604 | 1701030407400 |
| Marble Creek | 1604 | 1701030407200 |
| Marble Creek | 1604 | 1701030407100 |
| Marble Creek | 1604 | 1701030407000 |
| Fishhook Creek | 1608 | 1701030408700 |
| Sisters Creek | 1613 | 1701030409400 |
| Sisters Creek | 1613 | 1701030409300 |
| Alpine Creek | | 1701030409500 |
| St. Maries River | 1579 | 1701030401700 |
| St. Maries River | 1579 | 1701030401800 |
| St. Maries River | 1579 | 1701030402000 |
| St. Maries River | 1579 | 1701030402200 |
| St. Maries River | 1580 | 1701030402600 |
| St. Maries River | 1580 | 1701030402700 |
| St. Maries River | 1580 | 1701030402800 |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| St. Maries River | 1580 | 1701030403000 |
| St. Maries River | 1580 | 1701030403100 |
| St. Maries River | 1580 | 1701030403500 |
| St. Maries River | 1580 | 1701030403600 |
| St. Maries River | 1580 | 1701030403800 |
| St. Maries River | 1580 | 1701030403900 |
| Alder Creek | 1583 | 1701030401900 |
| Santa Creek | 1585 | 1701030402400 |
| Santa Creek | 1585 | 1701030402300 |
| Charlie Creek | 1587 | 1701030402500 |
| Tyson Creek | 1589 | 1701030402900 |
| Carpenter Creek | 1591 | 1701030403200 |
| Carpenter Creek | 1591 | 1701030403400 |
| Emerald Creek | 1593 | 1701030403700 |
| St. Maries River, M. Fk. | 1594 | 1701030404100 |
| St. Maries River, M. Fk. | 1594 | 1701030404200 |
| St. Maries River, M. Fk. | 1594 | 1701030404300 |
| Brickel Creek | 1437 | 17010214 |
| Mokins Creek | 1557 | 1701030502701 |
| Mokins Creek | 1557 | 1701030502702 |
| Rathdrum Creek | 1560 | 1701030501900 |
| Fish Creek (Twin Lake trib.) | 1561 | 1701030500700 |
| Hangman Creek | 1565 | 1701030600800 |
| Hangman Creek | 1566 | 1701030600801 |
| Hangman Creek | 1566 | 1701030600802 |
| Hangman Creek, Little | 1567 | 1701030600901 |

| North Central Idaho Regional Office | | |
|---|---|---|
| **Stream Name** | **PNRS #** | **River Reach #** |
| Gold Creek | | 17060306 |
| Chamook Creek | | 17060306 |
| Yakus Creek | | 17060306 |
| Mud Creek | | 17060306 |
| Dollar Creek | | 17060306 |
| Tom Taha Creek | | 17060306 |
| Fivemile Creek | | 17060306 |
| Holes Creek | 1140.01 | |
| Longhollow Creek | 1140.02 | |
| Lindsay Creek | 1141 | |
| Hatwai Creek | 1142 | |
| Lapwai Creek | 1143 | |
| Lapwai Creek | 1167 | |
| Sweetwater Creek | 1145 | |
| Sweetwater Creek | 1145.1 | |
| Webb Creek | 1146 | |
| Mission Creek | 1147 | |
| Cottonwood Creek | 1160 | |
| Pine Creek | 1161 | |
| Bedrock Creek | 1162 | |
| Bedrock Creek | 1162.1 | |
| Jacks Creek | 1163 | |
| Big Canyon Creek | 1164 | |
| Big Canyon Creek | 1164.1 | |
| Little Canyon Creek | 1165 | |
| Whiskey Creek | 1170 | |
| Jim Ford Creek | 1171 | |
| Grasshopper Creek | 1172 | |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Lolo Creek | 1173 | |
| Lolo Creek | 1174 | |
| Eldorado Creek | 1175 | |
| Jim Brown Creek | 1176 | |
| Musselshell Creek | 1177 | |
| Yoosa Creek | 1178 | |
| Sixmile Creek | 1178 | |
| Laywer Creek | 1180 | |
| Laywer Creek | 1180.1 | |
| Willow Creek | 1180.01 | |
| Camp Creek | 1180.05 | |
| Sevenmile Creek | 1181 | |
| Catholic Creek | 1148 | |
| Clear Creek | 1281 | |
| Browns Spring Creek | | 17060304 |
| Little Tinker Creek | | 17060304 |
| Lodge Creek | | 17060304 |
| Maggie Creek | 1280 | |
| Pine Knob Creek | | 17060304 |
| Solo Creek | | 17060304 |
| Tammany Creek | 1311 | |
| Cow Creek | 1136 | |

| South Western Idaho Regional Office | | |
|---|---|---|
| **Stream Name** | **PNRS #** | **River Reach #** |
| SF Owyhee | 632 | |
| MF Owyhee | 640 | |
| Mary's | 565 | |
| Blue | 628 | |
| Shoofly | 630 | |
| Nickle | 618.10 | |
| Pole | 617 | |
| Deep | 614 | |
| Deadman | 425 | |
| Sailor | 420 | |
| Hot | 557 | |
| Castle | 680 | |
| Picket | 681 | |
| Brown | 682 | |
| Boise River | 726 | |
| Boise River | 727 | |
| Boise River | 728 | |
| Boise River | 729 | |
| Indian | 732 | |
| Soldier | 697 | |
| Crane | 840 | |
| Crane | 841 | |
| Crane | 842 | |
| Little Weiser | 845 | |
| Hog | 829 | |
| Jenkins | 831 | |
| Big | 891 | |
| Big Jacks | 554 | |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Juniper | 644 | |
| Wildhorse | 820 | |
| WF Pine | 848 | |
| Six bit | | |
| Box | | |
| Big Willow | 694 | |
| Succor | 671.10 | |
| Johnson | 850 | |
| Duck | | |
| MF Payette | 703 | |
| Landing | | |
| French | | |
| Van Wyck | | |
| Deer | | |
| Poison | | |
| Mud | | |
| Lake Fork | | |
| Gold Fork | | |
| Boulder | | |
| Kennelly | | |
| Duck | | |
| Willow | | |
| Hazard | | |
| Silver | | |
| Campbell | | |
| Box | | |
| Brush | | |
| Deadhorse | | |
| Landing | | |
| Fall | | |

| Stream Name | PNRS # | River Reach # |
|---|---|---|
| Cougar | | |
| Twentymile | | |
| Elip | | |
| Deep | | |
| NF Payette | | |
| Trail | | |

# Appendix III. REGION SPECIFIC MONITORING PLAN

Costs associated with this publication are available
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